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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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**[Document Name]Description**

**[Title of the Invention]**A treating solution discharge nozzle and liquid treatment devices

**[Claim(s)]**

**[Claim 1]**A treating solution discharge nozzle which carries out discharge of the treating solution to a processed object, comprising:

A liquid-sending pipe which sends a treating solution.

Said liquid-sending pipe is open for free passage, and it has a discharge part which carries out discharge of the treating solution, and is liquid holding power to said discharge part.

**[Claim 2]**A treating solution discharge nozzle which carries out discharge of the treating solution to a processed object, comprising:

A liquid-sending pipe which sends a treating solution.

Said liquid-sending pipe is open for free passage, a discharge part which carries out discharge of the treating solution to the lower part is formed, and it has a nozzle block arranged at an abbreviated horizontal direction, and is liquid holding power.

[Claim 3]The treating solution discharge nozzle according to claim 2, wherein said porous body is approached and allocated in said discharge part.

[Claim 4]A treating solution discharge nozzle given in any 1 paragraph of Claim 1, wherein said porous body is a hollow fiber or a hollow fiber bunch to Claim 3.

[Claim 5]The treating solution discharge nozzle according to claim 4, wherein said treating solution is supplied to a hollow part currently formed in said hollow fiber or a hollow fiber bunch and said treating solution is filtered and discharged in the exterior of said hollow fiber or a hollow fiber bunch.

[Claim 6]A treating solution discharge nozzle given in any 1 paragraph of Claim 1, wherein said porous body is a hollow fiber, a membrane filter, or a ceramics filter to Claim 3.

[Claim 7]An attaching part holding a substrate.

A treating solution discharge nozzle moving mechanism which moves a treating solution discharge nozzle which carries out discharge of the treating solution on the surface of a substrate, and said treating solution discharge nozzle to the upper part of a substrate from a position in readiness.

A porous body which it is liquid treatment devices provided with the above, and said treating solution discharge nozzle is opened for free passage by a liquid-sending pipe which sends a treating solution, and the liquid-sending pipe concerned, has a discharge part which carries out discharge of the treating solution, and has liquid holding power in said discharge part is allocated.

[Claim 8]An attaching part holding a substrate.

A treating solution discharge nozzle moving mechanism which moves a treating solution discharge nozzle which carries out discharge of the treating solution on the surface of a substrate, and said treating solution discharge nozzle to the upper part of a substrate from a position in readiness.

Are the above the liquid treatment devices which it had, and, [ said treating solution discharge nozzle ] It has a liquid-sending pipe which sends a treating solution, and a nozzle block which said liquid-sending pipe is open for free passage, and a discharge part which carries out discharge of the treating solution to the lower part is formed, and is arranged at an abbreviated horizontal direction, and a porous body which has liquid holding power is allocated in said nozzle block almost in parallel with the

length direction.

[Claim 9]The liquid treatment devices according to claim 7 or 8, wherein said porous body is a hollow fiber or a hollow fiber bunch.

[Claim 10]The liquid treatment devices according to claim 9, wherein said treating solution is supplied to a hollow part currently formed in said hollow fiber or a hollow fiber bunch and said treating solution is filtered and discharged in the exterior of said hollow fiber or a hollow fiber bunch.

[Claim 11]The liquid treatment devices according to claim 7 or 8, wherein said porous object is a hollow fiber, a membrane filter, or a ceramics filter.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the treating solution discharge nozzle and liquid treatment devices which perform liquid processing, for example to the glass substrate for liquid crystal displays (LCD), or a substrate like a semiconductor wafer.

[0002]

[Description of the Prior Art]For example, in manufacture of a liquid crystal display (LCD), Photoresist liquid is applied to the LCD board of glass rectangles, a resist film is formed, a resist film is exposed corresponding to a circuit pattern, and a predetermined pattern is formed by what is called photolithographic technique [ say / carrying out the processing procedure of this ].

[0003]Formation of such a circuit pattern is performed using resist application / development system by which two or more processing units were collected. In such a system, first, after surface modification and washing processing are performed by the ultraviolet exposure if needed to a substrate, brush washing and ultrasonic water washing are performed by the washing unit. Then, in order that a substrate may improve the stability of a resist, canal-ized processing (HMDS processing) is carried out with an adhesion process unit, Then, a resist application is performed in a resist application unit, a predetermined pattern is exposed with an exposure device after prebaking, and also in a processing procedure unit, a processing procedure is carried out, postbake processing is carried out, and a predetermined circuit pattern is formed.

[0004]When it explains in more detail about a processing procedure unit, here, [ a processing procedure unit ] The developing solution discharge nozzle which carries out discharge of the developing solution to a substrate, and the rinse discharge nozzle which carries out discharge of the rinse after a processing procedure, It has the cup which collects the moving mechanism which moves the spin zipper, and the developing solution discharge nozzle and the rinse discharge nozzle for substrate maintenance on a substrate from a position in readiness, respectively, and the treating solutions (a developing solution, a rinse) shaken off to the circumference of a spin zipper.

[0005]When carrying out a processing procedure in this processing procedure unit, first, a substrate is laid on a spin zipper, a developing solution discharge nozzle is moved on a substrate from a position in readiness, and the liquid peak of the developing solution is carried out on a substrate. A developing solution discharge nozzle moves to a position in readiness after the end of the liquid peak. Shaking off a developing solution, moving a rinse discharge nozzle from a position in readiness subsequently to a substrate top, and rotating [ rotate a spin zipper, ] a spin zipper, after predetermined carries out developing time maintenance in this state, discharge of the rinse is carried out and it is carried out. Then, it dries by stopping supply of \*\* and a rinse shaking off. It shakes off and a rinse discharge nozzle moves to a position in readiness after dryness.

[0006]

[Problem to be solved by the invention]As mentioned above, various treating solutions, such as thinner used before and after rinse water, a developing solution, a resist, and a resist application, were breathed out from the nozzle, but there was a case where a liquid reservoir produced near the

discharge mouth of a nozzle after discharge, and a product was conventionally polluted with the liquid lappet of this liquid reservoir.

[0007]For example, when generated by the liquid lappet of resist liquid from the resist discharge nozzle which performs a resist application, problems, like the portion from which the thickness of a resist film differs in polar zone arises, and application unevenness arises occur, and generating of inferior goods is caused as a result. And in order to avoid this problem, when a sack back function is attached, problems, like the structure of a nozzle becomes complicated and the manufacturing cost of the resist discharge nozzle itself becomes high are produced.

[0008]Also in a processing procedure, when a developing solution dripped and falls to the portion which separated from the predetermined developing solution discharge position while storing a developing solution discharge nozzle, development accuracy may differ partially and deterioration of quality is caused.

[0009]In a rinse process, when it shakes off, dryness finishes and a rinse discharge nozzle moves to a position in readiness, a possibility that a rinse may carry out a liquid lappet from a rinse discharge nozzle is on a substrate. When the liquid lappet of a rinse happens, a possibility that marks will be attached on a substrate, or the rinse which dripped and fell will adhere to a substrate transport device, and a rinse will adhere to other substrates becomes large. Thus, if the remains of a rinse stick on a substrate or it adheres to other boards, the problem that the yield of a product falls will be produced.

[0010]This invention was made in view of this situation, and is \*\*\*\*. The purpose is to provide the liquid treatment devices with which the treating solution was provided with the treating solution discharge nozzle and such a treating solution discharge nozzle which prevented carrying out a liquid lappet on the substrate at the time of movement, without making structure complicate about the discharge nozzle of \*\*.

[0011]

[Means for solving problem]In order to solve the above-mentioned technical problem, according to this invention, [ as 1st treating solution discharge nozzle ] It is a treating solution discharge nozzle which carries out discharge of the treating solution to a processed object, and the liquid-sending pipe which sends a treating solution, and said liquid-sending pipe are open for free passage, it has a discharge part which carries out discharge of the treating solution, and treating solution discharge nozzle \*\*, wherein the porous body which has liquid holding power is allocated in said discharge part is provided.

[0012]The liquid-sending pipe which according to this invention is a treating solution discharge nozzle which carries out discharge of the treating solution to a processed object as 2nd treating solution discharge nozzle, and sends a treating solution, Said liquid-sending pipe is open for free passage, the discharge part which carries out discharge of the treating solution to the lower part is formed, it has a nozzle block arranged at an abbreviated horizontal direction, and treating solution discharge nozzle \*\*, wherein the porous body which has liquid holding power is allocated in said nozzle block almost in parallel with the length direction is provided. As for a porous body, about this 2nd treating solution discharge nozzle, approaching and allocating in a discharge part is preferred.

[0013]the [ which was mentioned above ] -- the [ 1 and ] -- in the treating solution discharge nozzle of two, the treating solution which remains after the discharge of the treating solution of the specified quantity in a discharge part is held by the power of absorption using the capillarity etc. which the porous body allocated in the proper place has in a discharge part, without carrying out a liquid lappet. Thereby, generating of the liquid lappet from a nozzle is prevented and improvement in the production yield is achieved.

[0014]the [ these ] -- the [ 1 and ] -- as a porous body in the treating solution discharge nozzle of two, When a hollow fiber or a hollow fiber bunch is used suitably and uses such materials, it is preferred to have composition which a treating solution is supplied to the hollow part currently formed in the hollow fiber or the hollow fiber bunch, and a treating solution is filtered, and is discharged in the exterior of a hollow fiber or a hollow fiber bunch, and also is breathed out from a discharge part. Thereby, in addition to the liquid maintenance by a porous body, a porous body functions also as a filter and it becomes possible to remove the unnecessary solid in a treating solution, etc.

[0015]As other porous bodies, a hollow fiber, a membrane filter, and a ceramics filter can be mentioned, for example. It is preferred that the pore diameter is small, also by such a material, a

treating solution will be filtered and any material can prevent adhesion of a particle etc. on processed objects, such as a substrate, so that it may have liquid holding power.

[0016]the [ now, / which was mentioned above according to this invention ] -- the [ 1 and ] -- the liquid treatment devices which have a treating solution discharge nozzle of two are also provided. Namely, the attaching part holding a substrate and the treating solution discharge nozzle which carries out discharge of the treating solution to the surface of a substrate, Are the treating solution discharge nozzle moving mechanism which moves said treating solution discharge nozzle to the upper part of a substrate from a position in readiness liquid treatment devices to provide, and, [ said treating solution discharge nozzle ] The liquid-sending pipe which sends a treating solution, and the liquid-sending pipe concerned are open for free passage, it has a discharge part which carries out discharge of the treating solution, and liquid-treatment-devices \*\*, wherein the porous body which has liquid holding power is allocated in said discharge part is provided.

[0017]The attaching part holding a substrate and the treating solution discharge nozzle which carries out discharge of the treating solution to the surface of a substrate, Are the treating solution discharge nozzle moving mechanism which moves said treating solution discharge nozzle to the upper part of a substrate from a position in readiness liquid treatment devices to provide, and, [ said treating solution discharge nozzle ] The liquid-sending pipe which sends a treating solution, and said liquid-sending pipe are open for free passage, and the discharge part which carries out discharge of the treating solution to the lower part is formed, It has a nozzle block arranged at an abbreviated horizontal direction, and liquid-treatment-devices \*\*, wherein the porous body which has liquid holding power is allocated in said nozzle block almost in parallel with the length direction is provided. the [ which was mentioned above for the treating solution discharge nozzle in these liquid treatment devices ] -- the [ 1 and ] -- the various forms of the treating solution discharge nozzle of two can be applied, and, thereby, the liquid treatment devices which are excellent in processing efficiency are provided.

[0018]

[Mode for carrying out the invention]Hereafter, with reference to an accompanying drawing, an embodiment of the invention is described in detail. The LCD board to which the liquid treatment devices with which the treating solution discharge nozzle and this treating solution discharge nozzle of this invention were used for drawing 1 are applied suitably. (it is hereafter described as a "substrate"). -

- it is a top view showing a resist application and a processing procedure system (it is hereafter described as a "processing system".), and suppose first that this processing system is outlined.

[0019]The cassette station 1 in which this processing system lays the cassette C which accommodates two or more substrates G, The treating part 2 provided with two or more processing units for performing a series of processings which include a resist application and development in the substrate G, It has the interface part 3 for delivering the substrate G between exposure devices (not shown), and the cassette station 1 and the interface part 3 are arranged to the both ends of the treating part 2, respectively.

[0020]The cassette station 1 is provided with the conveyance mechanism 10 for conveying the substrate G between the cassette C and the treating part 2. And carrying-in appearance of the cassette C is performed at the cassette station 1. The conveyance mechanism 10 is provided with the conveyance arm 11 which can move in the conveyance way 10a top provided along the arrangement direction of a cassette, and conveyance of the substrate G is performed by this conveyance arm 11 between the cassette C and the treating part 2.

[0021]The treating part 2 is divided into the pre-stage 2a, the middle part 2b, and the post-stage 2c, it has the conveyance ways 12, 13, and 14 in the center, respectively, and each processing unit is allocated in the both sides of these conveyances way. And the relay parts 15 and 16 are formed among these.

[0022]The pre-stage 2a is provided with the main conveying machine 17 which can move along the conveyance way 12, and, [ the one side of the conveyance way 12 ] The two washing units (SCR) 21a and 21b are arranged, To the other side of the conveyance way 12, an ultraviolet exposure unit. The processing block 27 which the processing block 25 which (UV) and a refrigeration unit (COL) put on two steps, the processing block 26 which a heat-treatment unit (HP) comes to put on two steps, and a refrigeration unit (COL) come to put on two steps is arranged.

[0023]The middle part 2b is provided with the main conveying machine 18 which can move along the conveyance way 13, and, [ the one side of the conveyance way 13 ] The periphery resist removal unit (ER) 23 which removes the resist of the edge part of the resist application processing unit (CT) 22 and



the substrate G is formed in one, and, [ the other side of the conveyance way 13 ] A heat-treatment unit. The processing block 28 which (HP) comes to put on two steps, The processing block 29 which a heat-treatment unit (HP) and a cooling processing unit (COL) come to pile up up and down, and the processing block 30 which an adhesion process unit (AD) and a refrigeration unit (COL) come to pile up up and down are arranged.

[0024]The post-stage 2c is provided with the main conveying machine 19 which can move along the conveyance way 14, and, [ the one side of the conveyance way 14 ] The three processing procedure units (DEV) 24a, 24b, and 24c are arranged, The processing block 31 which a heat-treatment unit (HP) comes to put on two steps, and the processing blocks 32 and 33 which a heat-treatment unit (HP) and a cooling processing unit (COL) both come to pile up up and down are arranged at the other side of the conveyance way 14.

[0025]The treating part 2 to one side across a conveyance way The washing processing unit 21a, It has structure which arranges only a spinner system unit like the resist processing unit 22 and the processing procedure unit 24a, and arranges only heat system processing units, such as a heat-treatment unit and a cooling processing unit, to the another side side.

[0026]The space 35 for the medical fluid supply unit 34 being arranged, and also maintaining the main conveying machine is provided for the portion by the side of spinner system unit arrangement of the relay parts 15 and 16.

[0027]The main conveying machines 17, 18, and 19 are provided with X axis driving of the 2-way in the level surface, Y axis driving, and vertical Z axis driving, respectively, and also are provided with the rotary drive which rotates focusing on the Z-axis, and have an arm (not shown) which supports the substrate G, respectively.

[0028]The main conveying machine 17 has carrying in and taking out of the substrate G to each processing unit of the pre-stage 2a, and also the function to deliver the substrate G between the relay parts 15 while delivering the substrate G between the arms 11 of the conveyance mechanism 10. The main conveying machine 18 has carrying in and taking out of the substrate G to each processing unit of the middle part 2b, and also the function to deliver the substrate G between the relay parts 16 while

delivering the substrate G between the relay parts 15. The main conveying machine 19 has carrying in and taking out of the substrate G to each processing unit of the post-stage 2c, and also the function to deliver the substrate G between the interface parts 3 while delivering the substrate G between the relay parts 16. The relay parts 15 and 16 function also as a cooling plate.

[0029]The interface part 3 is provided with the following.

The extension 36 which holds a substrate temporarily [ when delivering a substrate between the treating parts 2 ].

The two buffer stages 37 which were established in the both sides and which arrange a buffer cassette.

The conveyance mechanism 38 in which carrying-in appearance of the substrate G between these and an exposure device (not shown) is performed.

The conveyance mechanism 38 is provided with the conveyance arm 39 which can move in the conveyance way 38a top provided along the arrangement direction of the extension 36 and the buffer stage 37, and conveyance of the substrate G is performed by this conveyance arm 39 between the treating part 2 and an exposure device.

[0030]Thus, by collecting each processing unit and unifying, a space saving and the increase in efficiency of processing can be attained.

[0031]In the processing system constituted in this way, The substrate G in the cassette C is conveyed by the treating part 2, and, [ the treating part 2 ] First, surface modification and washing processing are performed in the ultraviolet exposure unit (UV) of the processing block 25 of the pre-stage 2a, After being cooled in a cooling processing unit (COL), SUKURABA washing is performed in the washing units (SCR) 21a and 21b, and after drying by heating is carried out in one heat-treatment unit of the processing blocks 26 (HP), it is cooled with one refrigeration unit (COL) of the processing blocks 27.

[0032]In order [ then, ] for the substrate G to be conveyed by the middle part 2b and to improve the fixability of a resist, Canal-ized processing (HMDS processing) is carried out with the adhesion process unit (AD) of the upper row of the processing block 30, A resist is applied in the resist application processing unit (CT) 22 after cooling by the cooling processing unit (COL) of the lower berth, and a resist with an excessive periphery of the substrate G is removed in the periphery resist removal unit (ER) 23. Then, prebaking processing is carried out by one of the heat-treatment units (HP) in the

middle part 2b, and the substrate G is cooled with the refrigeration unit (COL) of the lower berth of the processing block 29 or 30.

[0033]Then, the substrate G is conveyed by the exposure device via the interface part 3 with the main conveying machine 19 from the relay part 16, and a predetermined pattern is exposed there. And after carrying in the substrate G via the interface part 3 again and performing postexposure bake processing if needed in one heat-treatment unit of the processing blocks 31, 32, and 33 of the post-stage 2c (HP), A processing procedure is carried out by either of the processing procedure units (DEV) 24a, 24b, and 24c, and a predetermined circuit pattern is formed. After postbake processing was performed to the substrate G by which the processing procedure was carried out in one heat-treatment unit of the post-stages 2c (HP), It is cooled with one of refrigeration units (COL), and is accommodated in the predetermined cassette on the cassette station 1 by the main conveying machines 19, 18, and 17 and the conveyance mechanism 10.

[0034]Although this invention is used about discharge, such as various treating solutions used in the processing system mentioned above, for example, substrate rinse water, (pure water), a resist, a developing solution, and a rinse, it presupposes a development unit (DEV) hereafter that this invention is explained to an example.

[0035]Drawing 2 is a sectional view of a processing procedure unit (DEV), and drawing 3 is a top view of a processing procedure unit (DEV). In [ as shown in drawing 2 ] the processing procedure units (DEV) 24a, 24b, and 24c, Hold the substrate G mechanically, for example, are provided so that the spin zipper 41 may rotate with the rotary drive 42, and, [ below this spin zipper 41 ] The cover 43 which surrounds the rotary drive 42 is arranged, and the two under cups 44 and 45 are estranged and formed in the perimeter enclosure of this cover 43.

[0036][ above / between these two under cups 44 and 45 ] The inner cup 46 for mainly passing a developing solution below is formed enabling free rise and fall, and the outer cup 47 for mainly passing a rinse below is formed in the outside of the under cup 45 with the inner cup 46, enabling rise and fall free in one. In drawing 2, at the time of discharge of a developing solution, in left-hand side, the position where the inner cup 46 and the outer cup 47 go up is shown, and the position where these descend is shown in right-hand side on it at the time of discharge of a rinse.

[0037]The sink 48 for surrounding these whole processing procedure unit is formed, and the drain pipe 50b for the drain pipe 50a for the exhaust port 49 for exhausting the inside of a unit at the time of rotation dryness and a developing solution and a rinse is formed in the sink 48.

[0038]As shown in drawing 3, the nozzle arm 51 for developing solutions is formed in one outer cup 47 side, and the developing solution discharge nozzle 80 is stored in the nozzle arm 51. The nozzle arm 51 is constituted so that the substrate G may be crossed with the drive mechanisms 52, such as belt driving, and an orbit may be carried out along with the guide rail 53, and by this. [ at the time of the application of a developing solution ] The nozzle arm 51 scans the stationary substrate G, breathing out a developing solution from a developing solution supply nozzle.

[0039]The nozzle arm 54 for rinses, such as pure water, is formed in the another side side of the outer cup 47, and the rinse discharge nozzle 60 is formed in the tip portion of the nozzle arm 54. The nozzle arm 54 is formed by the drive mechanism 56 focusing on the axis 55, enabling free rotation. Thereby, while the nozzle arm 54 breathes out a rinse from the rinse discharge nozzle 60 at the time of the discharge of a rinse, the substrate G top is scanned.

[0040]The lid (not shown) is provided above the outer cup 47, enabling free rise and fall, and this lid is closed in the case of rinse. It cuts in the outer cup 47 and \*\*\*\* is formed so that a lid can be closed putting in the rinse discharge nozzle 60 in a cup.

[0041]The rotary drive 42 made to rotate the spin zipper 41, the drive mechanism 52 which drives the nozzle arm 51 for developing solutions, and the drive mechanism 56 made to rotate the nozzle arm 54 for rinses are controlled by the control device 70 by each to be shown in drawing 4.

[0042]Next, one embodiment which applied this invention to the rinse discharge nozzle 60 used for the processing procedure units (DEV) 24a, 24b, and 24c mentioned above is shown in the sectional view and front view of drawing 5. It has the structure where the discharge part 62 which extracted the outer diameter to the tip part of the tubular liquid-sending pipe 61 with the direct rinse discharge nozzle 60 shown in drawing 5 gradually was formed, and the porous body 64 which has liquid holding power is allocated in the discharge part 62.

[0043][ the inside diameter of the discharge mouth 63 which hits the opening of the discharge part 62 ] Although it may be the same as the inside diameter of the liquid-sending pipe 61 or you may be more than it, as shown in drawing 5, By extracting the path of the discharge mouth 63 smaller than the inside diameter of the liquid-sending pipe 61, the porous body 64 is preferred at the point that fall is prevented by the inner wall in the discharge part 62 at the time of the discharge of a rinse (treating solution), and it is not necessary to use other fixing methods.

[0044]In drawing 5, the porous body 64 can also use a film-like thing, although the thing of the truncated cone form is used. For example, as are shown in drawing 6 (a), and the metal fittings 66 are arranged inside the discharge part 62 and it is shown in the method of fixing the filmy body 65 between the metal fittings 66 and the inner wall of the liquid-sending pipe 61, and drawing 6 (b), In the discharge part 62, it can constitute so that the liquid-sending pipe 61 can be divided into the body part 61a and the tip part 61b in the length direction, and the method of putting the filmy body 65 between the body part 61a and the tip part 61b, and fixing in the case of the combination using the connecting fitting 67, etc. can be used.

[0045]As the porous body 64, the high thing of liquid retaining capability is used by [ what has liquid holding power ], i.e., the state where stop liquid sending and liquid-sending pressure is not applied. For example, what has the capability which absorbs liquid according to the capillarity of a hollow fiber, a hollow fiber bunch, a hollow fiber, a membrane filter, a ceramics filter, etc., and is held is mentioned. Unless the quality of the material is invaded by treating solutions, such as a rinse, there is no restriction. Allocation is easy if a hollow fiber, a membrane filter, and a ceramics filter are used from the shape in the rinse discharge nozzle 60. What is necessary is to use what has a small pore diameter, or just to control the thickness of the material to allocate in the range which does not have forced an equipment burden, such as using a large-sized pump etc. for the discharge of a rinse, to have bigger liquid holding power, even when which material is used.

[0046]When the porous body 64 was allocated in the discharge part 62 of the rinse discharge nozzle 60, and a rinse is sent from the figure upper part of the liquid-sending pipe 61 using a pump, gas pressure, etc. and is breathed out from the discharge mouth 63, Even if a liquid reservoir is formed in about 63 discharge mouth, by the porous body 64, a rinse will be held and a liquid lappet will be avoided. When the liquid holding power of the porous body 64 is large, the fall can be prevented even

if power is applied to a liquid reservoir, when moving the rinse discharge nozzle 60. There is also an advantage which does not need to attach complicated liquid lappet preventive mechanisms, such as a suck back mechanism, as a result structure can be easy and can produce inexpensive in the rinse discharge nozzle 60.

[0047] Since the porous body 64 functions also as a filter, it also has the function to remove the solid impurities in a rinse, and also plays the role which prevents adhesion of the particle to a substrate, garbage, etc. Even if the porous body 64 causes a clog with the solid impurities contained in a rinse, If it is considered as the structure where the liquid-sending pipe 61 or the discharge part 62 can be removed, the porous body 64 is begun, exchange and washing of several kinds of parts are also easy, and if product quality is taken into consideration, what has the high running cost of a device will not become.

[0048] Since the free passage stoma of a large number to include functions as a discharge mouth, the porous body 64 also has a function which carries out discharge of the rinse uniformly from the porous body 64, but. [ the porous body ] The form which does not have liquid holding power for the purpose of such uniform discharge, or allocated the porous body with small liquid holding power is not included under the category of this invention.

[0049] Next, it explains, referring to the sectional view shown in the perspective view shown in drawing 7 (a), and drawing 7 (b) about one embodiment which applied this invention to the developing solution discharge nozzle 80. The developing solution discharge nozzle 80 comprises the nozzle block 82 opened for free passage by the liquid-sending pipe 81 which sends a developing solution, and the liquid-sending pipe 81. The nozzle block 82 serves as shape which has a long cavity in one way, and a treating solution (developing solution) is supplied in this cavity. The liquid-sending pipe 81 is connected with the air operation valve (not shown), and it is possible to control supply and a stop of a developing solution.

[0050] The discharge part 86 which carries out discharge of the developing solution is formed in the length direction of the nozzle block 82 for plurality with the prescribed interval, and a developing solution is breathed out from each discharge part 86 by the lower part of the nozzle block 82. Therefore, when a developing solution is breathed out moving the nozzle block 82 in the direction perpendicular to the length direction horizontally, a developing solution is breathed out uniformly

broadly and the liquid peak of the developing solution is carried out on the substrate G.

[0051]About each of the discharge part 86, as previously shown in drawing 5, it is possible to allocate a porous body near [ the ] a discharge mouth (the lower opening of the discharge part 86 is pointed out.), but the porous body 83 is allocated by the cavernous lower part of the nozzle block 82 in the developing solution discharge nozzle 80. Thereby, a treating solution is breathed out from the discharge part 86, after being filtered by the porous body 83, when passing the porous body 83.

[0052]In the developing solution discharge nozzle 80, since the porous body 83 is approached and allocated in the discharge part 86, even if a liquid reservoir is formed in the discharge part 86, a liquid lappet is prevented by the liquid holding power of the porous body 83. Since a developing solution is filtered by the porous body 83, the solid impurities in a developing solution are removed and adhesion of a particle etc. on a processed object (substrate) is prevented. On the other hand, if it is considered as the structure which can open and close the nozzle block 82, exchange is easy even if it is a case where the porous body 83 causes a clog.

[0053]\*\* at the time of a developing solution being filtered by the porous body 83 -- since it is breathed out disadvantage more by almost uniform pressure from the porous body 83 whole, it also plays the role which performs discharge of a developing solution uniformly from each discharge part 86. Thereby, on the whole, substrate treatment can be uniformly performed now. That is, when the porous body 83 is not allocated, it is easy to breathe out many developing solutions from the discharge part near the liquid-sending pipe 81, and, as a result, easy to produce unevenness in a processing procedure, but such a problem is avoided by allocation of the porous body 83. As the porous body 83, various kinds of materials mentioned above can be used.

[0054]Drawing 8 is an explanatory view showing the form of another developing solution discharge nozzle 85 which can be replaced with and used for the developing solution discharge nozzle 80 shown in drawing 7, The slot 88 where width was narrowed is formed in the lower part of the nozzle block 89 used for the developing solution discharge nozzle 85, and two or more discharge parts 84 are formed in it in the form projected in a lower part from this slot 88. Allocation of the porous body 87 can be performed by [ as being able to cover restoration or the discharge mouth of the discharge part 84 to the discharge part 84 ], and can be used like the nozzle block 80 mentioned above so that the slot 88 may be filled up.

[0055]Can replace with the nozzle block 82 shown in drawing 7, can use, and also drawing 9 is an explanatory view showing the form of another nozzle block, and, [ this nozzle block 90 ] The slit-like discharge part 91 is formed in the lower part, and the porous body 92 is allocated so that the discharge mouth of the discharge part 91 may be closed. Such composition can be considered to have formed continuously the discharge part of the developing solution discharge nozzles 80 and 85 mentioned above, and can be used like the developing solution discharge nozzles 80 and 85, and generates an equivalent effect.

[0056][ the nozzle blocks 82 89, and 90 shown in drawing 7 - drawing 9 ] Since it is the shape by which it has long shape in one way, the lower part was formed in the slot form, or width was narrowed, it is easy to fill up with and allocate the large hollow fiber and hollow fiber bunch of liquid holding power as a prescribed depth, as it meets in the length direction of the nozzle blocks 82, 89, and 90.

[0057]Drawing 10 (a) and (b) is an explanatory view showing the form which allocated the hollow fiber 95 and the hollow fiber bunch 96 in the inside using the nozzle block 90. When it is considered as such a form, it is easily possible to have composition which a developing solution is supplied to the hollow part 97 currently formed in the hollow fiber 95 or the hollow fiber bunch 96, and a developing solution is filtered and discharged in the exterior of the hollow fiber 95 or the hollow fiber bunch 96, and is further breathed out from each discharge part. In this case, fully taking advantage of the liquid holding power and filtration capability which the hollow fiber 95 or the hollow fiber bunch 96 has, it becomes possible to aim at improvement in processing performance.

[0058]In the form of drawing 10, a developing solution is supplied to the upper space of the inner cavity of the nozzle block 90 in which the hollow fiber 95 or the hollow fiber bunch 96 is not allocated, It can use as a filter and the method of carrying out discharge from the discharge part 91 can also be used so that the wall surface of the hollow fiber 95 or the hollow fiber bunch 96 may be passed through an inner cavity from the exterior of the hollow fiber 95 or the hollow fiber bunch 96 and it may be discharged outside again.

[0059]As mentioned above, although an embodiment of the invention has been described, this invention is not limited to the above-mentioned embodiment. For example, although the above-



mentioned embodiment explained a case where liquid treatment devices which used a treating solution discharge nozzle of this invention and this for a resist application and a processing procedure system were applied, it does not restrict to this. Although an LCD board has been explained as a processed board, it is possible to use about other substrates, such as a semiconductor wafer and CD board.

[0060]

[Effect of the Invention]According to [ above-mentioned passage ] this invention, after the end of discharge, since the porous body which has liquid holding power near the discharge part of various kinds of nozzles which carry out discharge of the treating solution is allocated, even if it is a case where a liquid reservoir is formed in a discharge mouth, liquid is attracted by the porous body and a liquid lappet is prevented by it. The prominent effect that improvement in the yield is achieved is generated without polluting by this the mechanism member to which a treating substrate and a substrate are moved. From a viewpoint of prevention of a liquid lappet, there is also an advantage it becomes possible not to attach complicated mechanisms, such as a sack back function, and for the design flexibility of structure or shape to become large, and to also hold down a manufacturing cost. According to this invention, since a porous body also has a filtration function of a treating solution, the various solid impurities in a treating solution are removed. Thereby, adhesion of the particle to a treating substrate, etc. is prevented and improvement in the quality of a product (treating substrate) and improvement in the yield are achieved. In addition, this invention generates various effects from a treating solution being uniformly breathed out from a porous body by allocating a porous body -- homogeneous improvement in liquid processing and by extension, the quality of a product are improved.

[Brief Description of the Drawings]

[Drawing 1]The top view showing resist application / development system by which the heat treatment equipment which is the target of this invention is applied.

[Drawing 2]The sectional view of a processing procedure unit (DEV).

[Drawing 3]The top view of a processing procedure unit (DEV).

[Drawing 4]The block diagram showing the control system in the processing procedure unit shown in drawing 2 and drawing 3.

[Drawing 5]The sectional view and front view showing one embodiment of the treating solution discharge nozzle (rinse discharge nozzle) to which this invention is applied.

[Drawing 6]The sectional view showing another allocation form of the porous body in a treating solution discharge nozzle given in drawing 5.

[Drawing 7]The perspective view and sectional view showing another embodiment of the treating solution discharge nozzle (developing solution discharge nozzle) to which this invention is applied.

[Drawing 8]The perspective view showing another embodiment of the treating solution discharge nozzle (developing solution discharge nozzle) to which this invention is applied.

[Drawing 9]The explanatory view showing another embodiment of the nozzle block used for the treating solution discharge nozzle (developing solution discharge nozzle) to which this invention is applied.

[Drawing 10]The explanatory view showing another embodiment of the nozzle block used for the treating solution discharge nozzle (developing solution discharge nozzle) to which this invention is applied.

[Explanations of letters or numerals]24a, 24b, 24c;. Processing procedure unit 41;. Spin zipper 42;. Rotary drive 46;. Inner cup 47; outer cup 60; A rinse discharge nozzle. (Treating solution discharge nozzle) 61; liquid-sending pipe 62; discharge part 63; discharge mouth 64; -- the porous body 80, the 85; developing solution discharge nozzle 81; liquid-sending pipes 82 and 89, the 90; nozzle blocks 83

and 87, and 92; -- a porous body 86; discharge part 88; slot 95; hollow fiber 96; hollow fiber bunch

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[Translation done.]